for U. S. filing

CLAIMS

I claim:

1. Process and a device for analysis of the structure of cultivated hedgerows adapted to a machine that is mobile in continuous operation in trained and/or staked plantations, such as vineyards, characterized in that the process utilizes an artificial vision system (4) functioning by direct transmission making it possible to determine blockages of light between one or more emitters (E1, E2, E3...) and one or more receivers (R1, R2, R3...) placed facing each other, on either side of the hedgerow, and in that the information produced by these blockages of light is handled by an electronic analysis system (7) programmed or configured to examine the elements of the structure of the hedgerow, either during the day or at night.

2. Process according to claim 1, characterized in that the influence of interfering solar light is eliminated by using a light periodically modulated by the emitters, the receivers only being sensitive to the modulated light and not to the continuous component of the light.

3. Process according to claims 1 or 2, characterized in that the significance of the interfering light is reduced by selecting emission and reception wavelengths for which the solar light is relatively weak, i.e. outside of the visible spectrum, either a wavelength of light less than 400 nm or greater than 750 nm, and, for example, a wavelength on the order of 950 nm.

4. Process according to one of the claims 2 or 3, in which the artificial vision system (4) comprises, on the one hand, at least one front emitter (E1) and rear emitter (E2), and, on the other hand, at least one front receiver (R11, R12, R13...) and a rear receiver (R21, R22, R23,...), in considering the direction of the movement of the machine designed for this vision system, characterized in that each front emitter (E1) and rear emitter (E2) emits, in an alternating manner, for

example, over a duration on the order of 500 ps, modulated light at a frequency corresponding to the frequency that matches the front receivers (R11, R12, R13...) and rear receivers (R21, R22, R23...), respectively.

5. Process according to claim 4, characterized in that the electronic analysis system is programmed or configured in order to handle the information generated by the blockages of light, in order to measure the speed of movement of the machine and to adjust the rotational speed of the rotary tools of the machine as a function of the measured speed of movement.

6. Process according to any one of the claims 1 to 5, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockages of light, in order to detect the stakes of the hedgerow.

7. Process according to claims 1 to 6, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockages of light, in order to detect the position of the cordon.

8. Process according to claims 1 to 7, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockage of light, in order to measure the health status of the plants.

9. Device for analysis of the structure of cultivated hedgerows, for example, for equipment for mobile machines designed for continuous operation in trained and/or staked plantations, such as vineyards, characterized in that it comprises an artificial vision system (4) functioning by direct transmission comprised of one or more emitters (E1, E2, E3...) and one or more receivers (R1i, R2i, R3j...), whereby this artificial vision system is arranged so that when it is mounted on a machine, one or more of its opto-electronic components can be arranged facing each other, on either side of the

fruit-bearing hedgerow which spans it, the device again comprising an electronic analysis system (7) programmed or configured to use the information produced by the blockages of the light or order to visualize and analyze the elements of the hedgerow, either during the day or at night.

10. Device according to claim 9, characterized in that the artificial vision system comprises, on the one hand, an emitter module (ME) made of at least one front emitter (E1) and rear emitter (E2), and, on the other hand, a receiver module (MR) made of at least one front receiver (R11, R12, R13...) and a rear receiver (R21, R22, R23,...), in considering the direction of the movement of the machine designed for this vision system, the distance (e) separating the front emitter (E1) and the rear emitter (E2) being less than the width of the stakes (Pi) of the paling of the fruit-bearing hedgerow.

11. Device according to claim 10, characterized in that the receiver module (MR) comprises at least one front vertical row comprised of several spaced receivers (R11, R12, R13...) and at least one rear vertical row comprised of several spaced receivers (R21, R22, R23...), each front emitter (E1) and rear emitter (E2) being designed in order to emit, in an alternating manner, for example, over a duration on the order of 500 s [sic –ps?], modulated light at a frequency corresponding to the frequency that matches the front receivers (R11, R12, R13...) and rear receivers (R21, R22, R23...), respectively.

12. Device according to one of the claims 10 or 11, characterized in that the receiver module (MR) comprises a third vertical row of receivers (R31, R32, R33...) for which the lower receiver (R31) is located at the lower part of the receiver module (MR), and in that the emitter module (ME) comprises, in the lower part, an emitter (E3) designed in order to emit, for example, every 500 us, light at a frequency corresponding to the frequency that matches the receivers (R31, R32, R33...) of the third row.

13. Device according to any one of the claims 9 to 12, characterized in that the electronic analysis system is programmed or configured in order to handle the information generated by the blockages of light, in order to measure the speed of movement of the machine.

14. Device according to any one of the claims 9 to 13, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockages of light, in order to detect the stakes of the hedgerow.

15. Device according to any one of the claims 9 to 14, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockages of light, in order to detect the position of the cordon.

16. Device according to any one of the claims 9 to 15, characterized in that the electronic analysis system is programmed or configured in order to use the information generated by the blockage of light, in order to measure the health status of the plants.

17. Device according to any one of the claims 9 to 16, characterized in that the emitter modules (ME) and receiver modules (MR) of the artificial vision system (4) are affixed onto the chassis (3-3a) of the machine using mechanisms permitting a regulation of their position, mainly by height, relative to the chassis.

18. Device according to any one of the claims 9 to 17, applied to pre-pruning machines, characterized in that the electronic analysis system is connected to the electro-distributor (9) of the control valve (6) that ensures the movement away from and return movement of the pruning elements (5) of the cutting head of these machines.

19. Device according to any one of the claims 9 to 18, for the implementation of the process according to the invention 5, applicable to pre-pruning machines, characterized in that the electronic

analysis system (7) is connected to the flow-regulation valve (11) of the hydraulic circuit for supplying the hydraulic motors (12) ensuring the rotary drive of the rotary cutting tools (5), whose speed of rotation is indicated to the electronic analysis system (7) by a rotation sensor (13) that is influenced by the measurement of this speed, which makes it possible to create feedback by closed loop with the electronic analysis system in order to adjust the rotational speed of the rotary tools (5) as a function of the speed of movement of the machine (2).

20. Device according to any one of the claims 9 to 19, for implementation of the process according to claim 7, applied to pre-pruning machines, characterized in that the electronic analysis system (7) is connected to an electronic distributor (16) of the control valve (17) ensuring the vertical movements of the pruning assemblies (14) of these machines.

21. Device according to any one of the claims 9 to 20, for implementation of the process according to claim 8, characterized in that the electronic analysis system (7) is connected to a computer able to produce data making it possible to determine the health status of the plants.